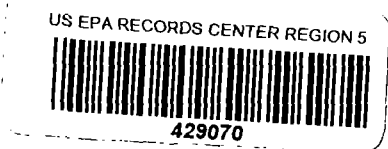


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Staff Report
Raisin River Sediment Contaminants
Lenawee and Monroe Counties, Michigan
August, 1976



Sediment sample analysis data presented here were to be included in an intensive basin biological study. However, that report will not be completed until after the follow-up 5 year intensive basin study to be undertaken next year. These data are presented here in order that they become readily available without further delay.

Figure 1 shows all the biological sampling stations including the 20 sediment sample locations. Table 1 is the analytical results from the sediment samples and Table 2 the EPA pollutional classification for sediments.

Findings

1. Six of the following areas and/or point sources contributed most of the contaminants to the Raisin River sediments:
 - (a) Combined storm sewer overflows within the City of Adrian.
 - (b) The Adrian Wastewater Treatment Plant (WWTP).
 - (c) East Drain in Adrian.
 - (d) Discharges within the City of Monroe.
 - (e) The Monroe WWTP.
 - (f) Ford Motor of Monroe
2. With the exception of nickel, heavy metals, organochlorines and oils in sediments outside the above river reaches were usually at "nonpolluted" EPA levels. Nickel was at or above "moderately polluted" levels at all stations, for unknown reasons.
3. Above the Adrian WWTP lead (86 mg/kg), nickel (80 mg/kg), copper (58 mg/kg), total chromium (45 mg/kg), and oils (2,500 mg/kg) were at levels above those found upstream from the City of Adrian and indicate loadings within the city.
4. Below the Adrian WWTP, lead (100 mg/kg), copper (100 mg/kg), cadmium (10 mg/kg) and zinc (1,400 mg/kg) increased markedly over upstream values, indicating further loadings via this facility. Mercury doubled from 0.19 mg/kg upstream to 0.38 mg/kg below the WWTP but always remained below the "polluted level" of less than 1.0 mg/kg.
5. East Drain sediments contained very high values of nickel (370 mg/kg), lead (290 mg/kg), copper (900 mg/kg), cadmium (66 mg/kg), total chromium (11,000 mg/kg), zinc (2,200 mg/kg), and oils (12,500 mg/kg). Detectable levels of PCB 1260 at 1,920 µg/kg were also found.
6. Above the Monroe WWTP, copper (90 mg/kg), zinc (130 mg/kg), lead (310 mg/kg) and oils (2,400 mg/kg) as well as PCB's (2,300 µg/kg) were elevated over sediment contaminant levels in the main stream of the Raisin River upstream.

Loading sources above the Monroe WWTP are indicated.

7. Loading of PCB's via the Monroe wastewater treatment plant were suggested by almost a tripling of PCB sediment concentrations to 7,080 µg/kg.
8. The highest levels of arsenic (12 mg/kg), copper (14,000 mg/kg), total chromium (11,000 mg/kg), nickel (5,800 mg/kg), lead (300 mg/kg), oils (24,000 mg/kg) and total PCB's (9,170 µg/kg) were found in sediments below the Ford Motor Company discharge to the Raisin River. Zinc (580 mg/kg) was also markedly elevated over all values from sediments, except those below the Adrian WWTP and in East Drain.
9. Mercury sediment concentrations were not found above the "nonpolluted" level of less than 1.0 mg/kg. Cadmium levels were at "polluted" levels only in East Drain (66 mg/kg) and below the Adrian WWTP (10 mg/kg).

Recommendations

1. A more intensive sediment sampling effort should be incorporated into next year's intensive basin monitoring program to determine the source(s) of the high Raisin River sediment nickel concentrations. Within Adrian and Monroe, point sources of contaminants should also be determined by intensively sampling sediments.

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Figure 1: Sampling Stations, 1973.

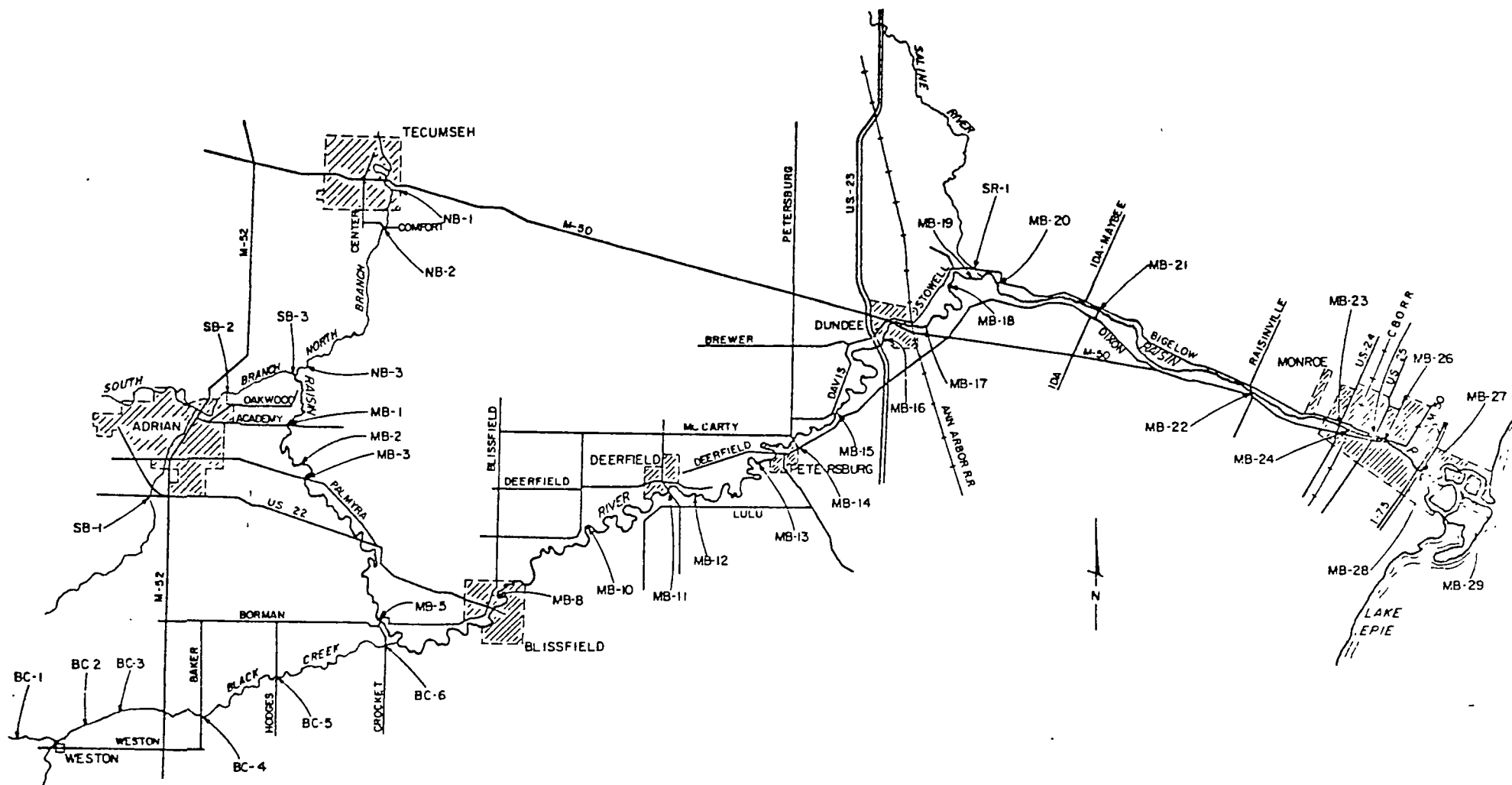


Table 1

Heavy metals, chlorinated hydrocarbons and oils (hexane extractables) in sediments from the Raisin River August 12, 1976. Pesticides (aldrin, dieldrin, chlordane, DDT and metabolites, HCB and HCBd) were not found above the level of detectability. All values relate to dry weight of sediments.

Location and Station Number	Arsenic mg/kg	Copper mg/kg	Mercury mg/kg	Cadmium mg/kg	Total Chromium mg/kg	Zinc mg/kg
N. Br. Raisin River, M-50, Tecumseh (NB-1)	4.4 *	18	0.05	0.4	10	68
Below Tecumseh WWTP (NB-2)	3.9 *	21	0.06	1.4	14	88
Above confluence/S. Br. (NB-3)	3.4 *	23	0.05	1.4	12	72
S. Br. Raisin River, Hwy. 223, Above Adrian (SB-1)	5.6 *	32 *	0.09	0.8	24	150 *
Above Adrian WWTP (SB-2)	2.25	58 **	0.19	2.4	45 *	130 *
Below Adrian WWTP (SB-3)	5.6 *	100 **	0.38	10.0 **	50 *	1400 **
East Drain	5.4 *	900 **	0.34	66 **	1100 **	2200 **
Raisin River - Palmyra (MB-3)	2.7	36 *	0.11	1.4	25 *	110 *
Black Creek below Palmyra (BC-6)	5.0 *	15	0.08	0.2	9.2	57
Raisin River below Blissfield (MB-8)	2.2	33 *	0.08	1.1	15	92 *
Below Deerfield (MB-12)	2.1	21	0.02	0.5	11	55
Below Petersburg (MB-14)	1.4	19	0.07	0.6	11	56
Below Dundee (MB-17)	3.4 *	33 *	0.08	0.6	11	110 *
Little Raisin River (LR-1)	4.0 *	14	0.03	0.1	5.6	46
Macon River (MR-1)	1.1	8.6	0.01	< 0.1	4.4	28
Saline River (SR-1)	2.5	44 *	0.01	< 0.1	26 *	54
Raisin River, Raisinville Road (MB-22)	2.1	20	0.02	0.2	13	54
Above Monroe WWTP (MB-27)	4.0 *	90 **	0.33	0.7	20	130 *
Below Monroe WWTP (MB-28) but above Ford discharge	1.4	30	0.08	< 0.1	15	58
Below Ford Discharge (MB-29)	12.0 *	14,000 **	0.21	< 0.1	11,000 **	580 **
Michigan Background levels mean + 2 Std. Dev.	2	--	0.29	11	3.9	53

Table 1 (continued)

Heavy metals, chlorinated hydrocarbons and oils (hexane extractables) in sediments from the Raisin River August 12, 1975. Pesticides (aldrin, dieldrin, chlordane, DDT and metabolites, HCB and HCBd) were not found above the level of detectability. All values relate to dry weight of sediments.

Location and Station Number	Nickel mg/kg	Lead mg/kg	Oils mg/kg	PCB 1242 µg/kg	PCB 1254 µg/kg	PCB 1260 µg/kg
N. Br. Raisin River, M-50, Tecumseh (NB-1)	25 *	23	900	< 500	< 500	< 500
Below Tecumseh WWTP (NB-2)	33 *	35	200	< 500	< 500	< 500
Above confluence/S. Br. (NB-3)	30 *	30	600	< 500	< 500	< 500
S. Br. Raisin River, Hwy. 223, Above Adrian (SB-1)	51 **	46 *	400	< 500	< 500	< 500
Above Adrian WWTP (SB-2)	41 *	86 **	2500 **	< 500	< 500	< 500
Below Adrian WWTP (SB-3)	80 **	100 **	2500 **	< 500	< 500	< 500
East Drain	370 **	290 **	12,500 **	< 500	< 500	1920
Raisin River - Palmyra (MB-3)	50 *	36	600	< 500	< 500	< 500
Black Creek below Palmyra (BC-6)	31 *	15	400	< 500	< 500	< 500
Raisin River below Blissfield (MB-8)	28 *	36	1600 *	< 500	< 500	< 500
Below Deerfield (MB-12)	31 *	17	2000 *	< 500	< 500	< 500
Below Petersburg (MB-14)	29 *	32	2100 **	< 500	< 500	< 500
Below Dundee (MB-17)	58 **	34	700	< 500	< 500	< 500
Little Raisin River (LR-1)	27 *	13	300	< 500	< 500	< 500
Macon River (MR-1)	20 *	10	1600 *	< 500	< 500	< 500
Saline River (SR-1)	38 *	22	500	< 500	< 500	< 500
Raisin River, Raisinville Road (MB-22)	25 *	25	900	< 500	< 500	< 500
Above Monroe WWTP (MB-27)	58 **	310 **	2400 **	1550	750	< 500
Below Monroe WWTP (MB-28) but above Ford discharge	27 *	24	700	5220	1860	< 500
Below Ford discharge (MB-29)	5800 ***	300 ***	24,000 **	4250	4920	< 500
Michigan Background levels mean + 2 Std. Dev.	--	99				

Proposed EPA (1975)

* moderately polluted

** heavily polluted

Table 2. U.S. Environmental Protection Agency pollutional classification of sediments.
All values in mg/kg dry weight except where indicated.

PARAMETERS	EPA 1975 (Proposed)			Present EPA Suggested Limits
	Non Polluted	Moderately Polluted	Heavily Polluted	Polluted
Volatile Solids (%)	< 5	5-8	> 8	> 6%
Oil and Grease	< 1,000	1,000-2,000	> 2,000	> 1,500
COD	< 40,000	40,000-80,000	> 80,000	50,000
Phosphorus	< 420	420-650	> 650	
Ammonia	< 75	75-200	> 200	
TKN	< 1,000	1,000-2,000	> 2,000	> 1,000
Cyanide	< 0.10	0.10-0.25	> 0.25	
Iron	< 17,000	17,000-25,000	> 25,000	
Manganese	< 300	300-500	> 500	
Barium	< 20	20-60	> 60	
Lead	< 40	40-60	> 60	> 50
Mercury	< 1.0	N.A.	> 1.0	> 1
Nickel	< 20	20-50	> 50	
Arsenic	< 3	3-8	> 8	
Cadmium	*	*	> 6	
Chromium	< 25	25-75	> 75	
Copper	< 25	25-50	> 50	
Zinc	< 90	90-200	> 200	> 50

*Lower limits not established